

# NASA TECH BRIEF

## Langley Research Center

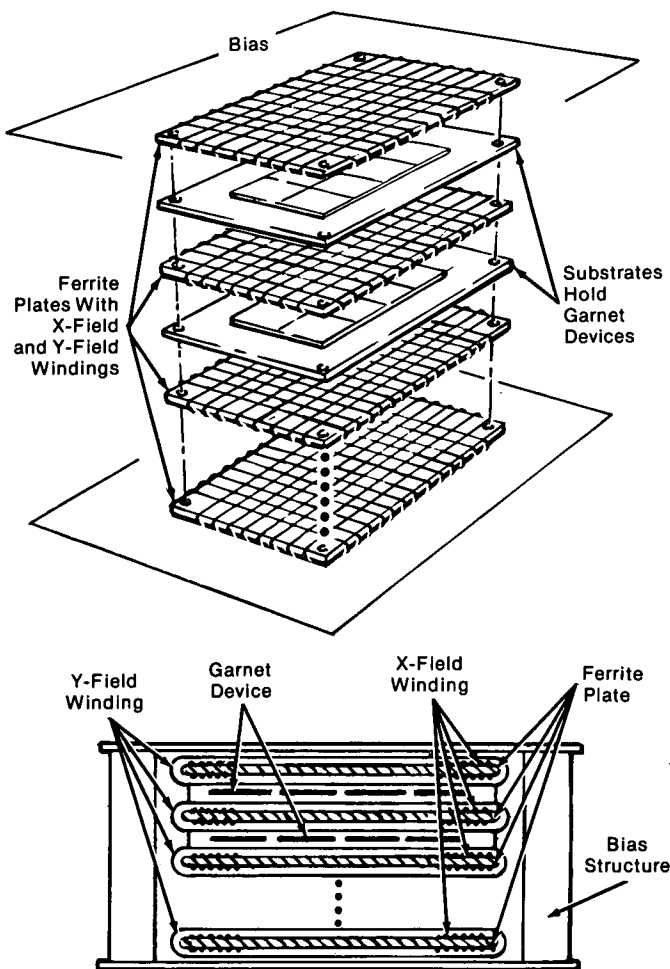


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### Open Coil Structure for Bubble-Memory-Device Packaging

The open-coil-structure packaging concept for bubble memory devices, shown in the illustration, has several important advantages over the close-wound coil system:

- a. All memory chips and coil chips are separate and interchangeable. Individual small packages for each coil are not required.
- b. Most of the interconnections in the coil level are eliminated by packing the memory chip and associated electronics in a single structure.
- c. Coil windings are separated from the device; therefore coil size can be independently adjusted to an optimum value in terms of power dissipation and field uniformity.



Open-Coil-Structure Packaging Concept for Bubble Memory Devices

(continued overleaf)

d. Forced air cooling can be easily implemented, for a better thermal equilibrium, as the whole structure is open.

In the open coil approach, coil windings are wrapped around a ferromagnetic plate such as ferrite plate. Because of the magnetic shielding effect of the ferromagnetic plate, the magnetic field in the space above or below the coil winding is equivalent to the field generated by a single layer of conductors. (When two identical magnetic plate coils are placed in parallel, the magnetic field between the plates is identical to that generated inside a close-wound coil.)

A rotating field network is achieved by winding two orthogonal windings around the magnetic chips and stacking a number of these chip coils in a bias structure. The bubble devices are inserted between these coils as illustrated.

This approach can be extended to bubble-memory-module packaging where a large number of chips have to be driven in several independent rotating fields. All memory devices and their associated electronics can be mounted in planes, called device planes, and all magnetic chip coils and their driver electronics can be mounted in separate field planes. The device planes are then inserted in between coil planes and are placed in the bias structure. All memory chips under the same coil windings can be operated as an independent unit.

**Note:**

Requests for further information may be directed to:

Technology Utilization Officer  
Langley Research Center  
Mail Stop 139-A  
Hampton, Virginia 23665  
Reference: B75-10219

**Patent status:**

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act [42 U.S.C. 2457(f)], to the Rockwell International Corporation, 3370 Miraloma Avenue, Anaheim, California 92803.

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